

S
621.319
E29b5p
1976

NRIS 13

PLEASE RETURN

STATE DOCUMENTS COLLECTION

at
head

PRELIMINARY ENVIRONMENTAL REVIEW
AND REPORT TO THE BOARD

OCT 5 1981

MONTANA STATE LIBRARY
930 E Lyndale Ave.
Helena, Montana 59601

BROADVIEW-GRASSRANGE-GLENGARRY
100 KV LINE PROJECT

ENERGY PLANNING DIVISION
ALBERT C. TSAO, ADMINISTRATOR
DEPARTMENT OF NATURAL RESOURCES & CONSERVATION
GARY J. WICKS, DIRECTOR

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601

JUNE 1976

MSL OCT 28 '81

JUN 9 - 1987

JUN 24 1987

MONTANA STATE LIBRARY
S 621.319 E20bp c.1
Broadview-Grassrange-Glengarry 100 kV II

3 0864 00038829 1

Recommendation #1

The Department of Natural Resources and Conservation recommends to the Board of Natural Resources and Conservation that the applicants be permitted to build a 100 kV transmission line from a point near Grassrange to a point near Winnett Junction within the corridor described below.

The corridor is a two-mile-wide strip of land extending one mile on each side of a line beginning at the center of Section 28, Township 15 N, Range 23 E; proceeding to the northwestern corner of Section 11, Township 13 N, Range 23 E; thence to the northeastern corner of Section 1, Township 11 N, Range 24 E; thence to the southwest corner of Section 6, Township 11 N, Range 25 E.

Justification:

This recommendation is based upon the Department's engineering studies of the need for the entire line as proposed in the application and environmental studies of the Grassrange-Winnett Junction segment of the proposed line. Environmental studies were accelerated for the Grassrange-Winnett Junction segment at the request of the Board. Although the entire route of the proposed line was examined, more study will be needed prior to the Department's recommendation on the location of the remainder of the line.

Recommendation #2

If Recommendation #1 is adopted by the Board and a Certificate of Environmental Compatibility and Public Need is issued by the Board for the Grassrange to Winnett Junction segment, it is recommended that the Certificate be conditioned requiring the applicants to obtain approval from the Board regarding the location of the centerline, access roads, and staging areas, together with

detailed construction methods and plans, to minimize environmental impacts. The applicants should also be required to consult with land owners and the Department to establish these details prior to obtaining Board approval. The selection of a centerline within the corridor should follow wherever possible property boundary lines and existing fence lines, and should accommodate as much as possible the land owners' preferences.

The Department further recommends that the applicants and their contractors be required to follow construction practices which will result in minimum environmental impact, including impact upon visual characteristics of the area. Specifically, it is recommended that the centerline selection, construction, and maintenance follow criteria presented in two handbooks, National Forest Landscape Management, Volume 2, Chapter 2 - Utilities (USDA Handbook 478) and Environmental Criteria for Electric Transmission Systems (U.S. Dept. of Interior and USDA), and in addition, those mitigating measures for line construction as listed in Part IV, page of this report.

I. Introduction

The Montana Department of Natural Resources and Conservation received an application on April 12, 1976, for permission to construct a 100 kV transmission line from the Broadview Switchyard to the Glengarry substation. This application was submitted jointly by the Montana Power Company (MPC) and the Fergus Electric Cooperative (FEC) in accordance with the Major Facility Siting Act (see Figure 1).

Pursuant to Section 70-811(4)(a) of the Act, the applicants requested a waiver of Section 70-807 through 70-811 to the extent necessary so that construction of a 22.5-mile segment immediately south of Grassrange may begin in late summer and early fall of 1976. Issuance of a Certificate of Environmental

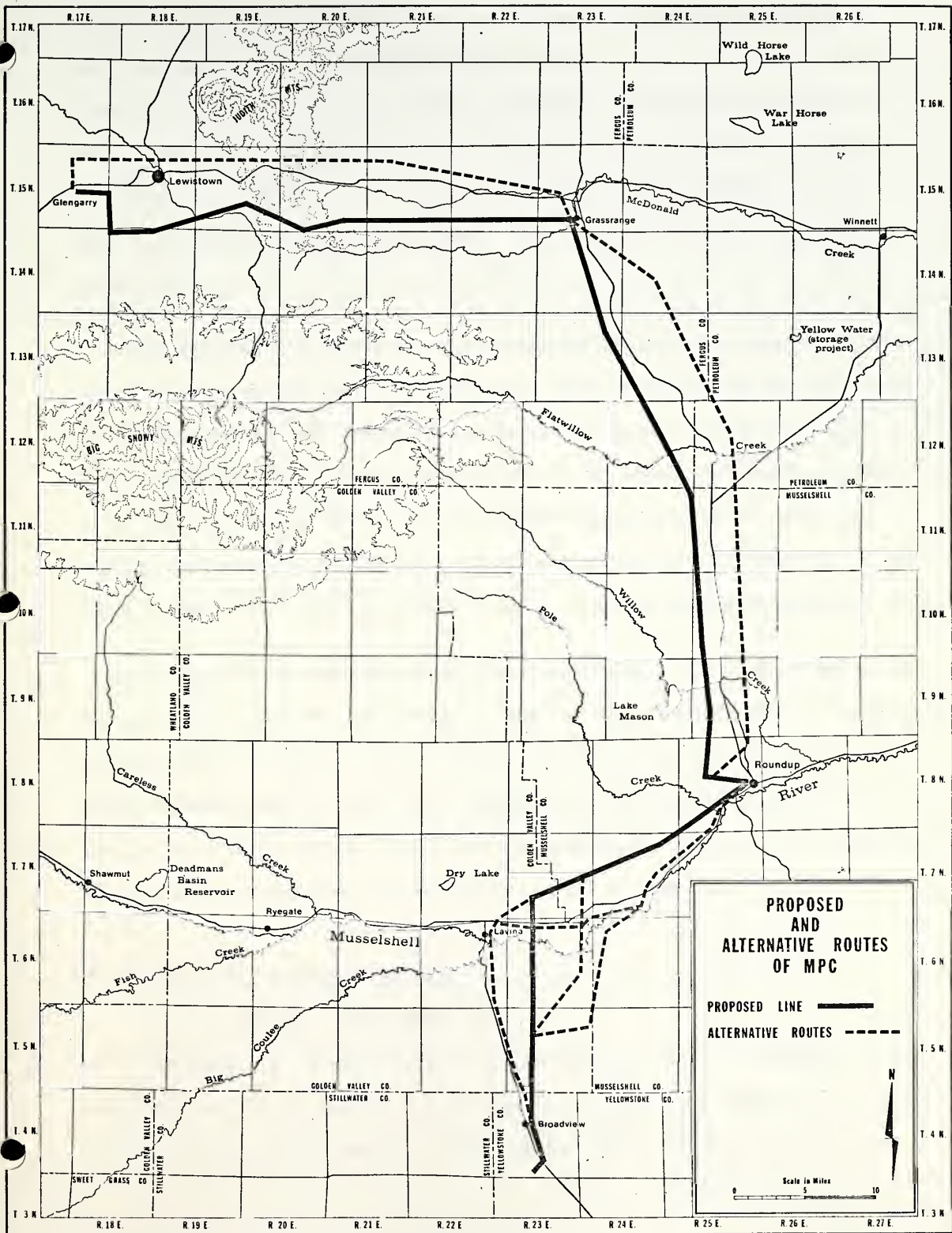


Figure 1

Compatibility and Public Need on or before June 1, 1976, was requested in order to meet the proposed construction schedule. On April 15, 1976, the Board of Natural Resources and Conservation held a hearing on the applicants' waive request, and denied the same. In addition, the Board requested the Department to conduct a Preliminary Environmental Review (PER) and report back to the Board at its June meeting. This document is the PER and report requested.

The Department's technical staff conducted an intensive investigation of the 22.5-mile segment south of Grassrange. This investigation was sufficient to evaluate whether the action of approving that segment would be a major action significantly affecting the quality of the human environment, thereby requiring the compilation of an Environmental Impact Statement under the Montana Environmental Policy Act. The area proposed for the remainder of the line, however, will require further study in order to determine potential impacts.

In the following review and report, a description of the proposed action and alternative actions is presented, need for the proposed action is analyzed, and the extent of potential environmental impacts along the 22.5-mile segment south of Grassrange is discussed. Mitigating measures which can effectively reduce the risk of adverse impact are also presented, along with the Department's recommendations regarding the 22.5-mile segment in question.

II. Engineering and Need Analysis

A. Description and Specifications

The applicants propose to build a 118-mile 100 kV line originating from the Broadview substation and terminating in the Glengarry substation. The proposed line would go in and out of the existing 50/4.2 kV Roundup substation

which would be extended to accommodate a 100/50 kV transformer and two 100 kV circuit breakers.

A new 100/50 kV substation would be established at Grassrange. In addition to 50 kV control equipment, the substation would house a 100/50 kV transformer and two 100 kV automatic airbreak switches to control the line.

The Roundup-Melstone-Sumatra 50 kV lines would be upgraded to 69 kV.

Line specifications are as follows:

1. Conductor--type: ACSR - diameter 0.721"
size: 336,400 circular mills
quantity: one per phase
2. Ground Wire--type: high strength steel strand
size: 3/8" diameter
quantity: one or two, depending on structure
3. Supports--type: wood poles
size: depends on terrain
quantity: two per structure; three per structure for angle positions
4. Ground Clearance: minimum 27 feet at +60°F
generally in line with National Electric Safety Code
5. Guys: used as and when required
6. Insulators--type: brown porcelain
size: 10" diameter
quantity: 5 per phase at line positions
6 per phase at angle positions
7. Thermal Capacity: 91.8 MVA
8. Power Loss: 2.8MW--3.1% of thermal rating
9. Theoretical voltage gradient (for corona): 14 kV/cm
50% of critical gradient

B. Need Analysis

1. Present Transmission System

The applicants are the sole power distributors in central Montana (see Figure 2). The MPC has two 50 kV power lines from its Painted Robe 100/50 kV substation near Lavina to the Roundup 50/4.2 kV substation. The FEC purchases power from the MPC at the Roundup substation at 50 kV and distributes it over an area extending to Grassrange in the north and Winnett in the east. Its 50 kV power line is approximately 70 miles long, and roughly forms two sides of a triangle between Grassrange and Winnett Junction.

The MPC has two fairly long 50 kV lines to Sumatra and Melstone. There is a substantial power flow along these lines.

In the Lewistown area, the MPC owns the two 50 kV power lines feeding the Lewistown Boulevard substation from the Glengarry substation which, in turn, is fed by a single 100 kV line from the Benchland substation. The FEC purchases power from the MPC at the Lewistown Boulevard substation at 50 kV and distributes it over a single 50 kV line to the Hilger and Roy areas, with the line eventually terminating near Grassrange. The MPC operates a 50 kV line from the Lewistown Boulevard substation to Heath.

2. Load and Load Growth

As shown above, central Montana has a very extensive 50 kV network. An analysis of the historical data has produced growth rates varying between -5.7% and +10.1% for various 50 kV substations (see Tables 1 and 2).

An examination of the historical data submitted by the applicants confirms the rates of growth computed by the applicant. However, because of the limited time available the Department has not been able to investigate the validity of

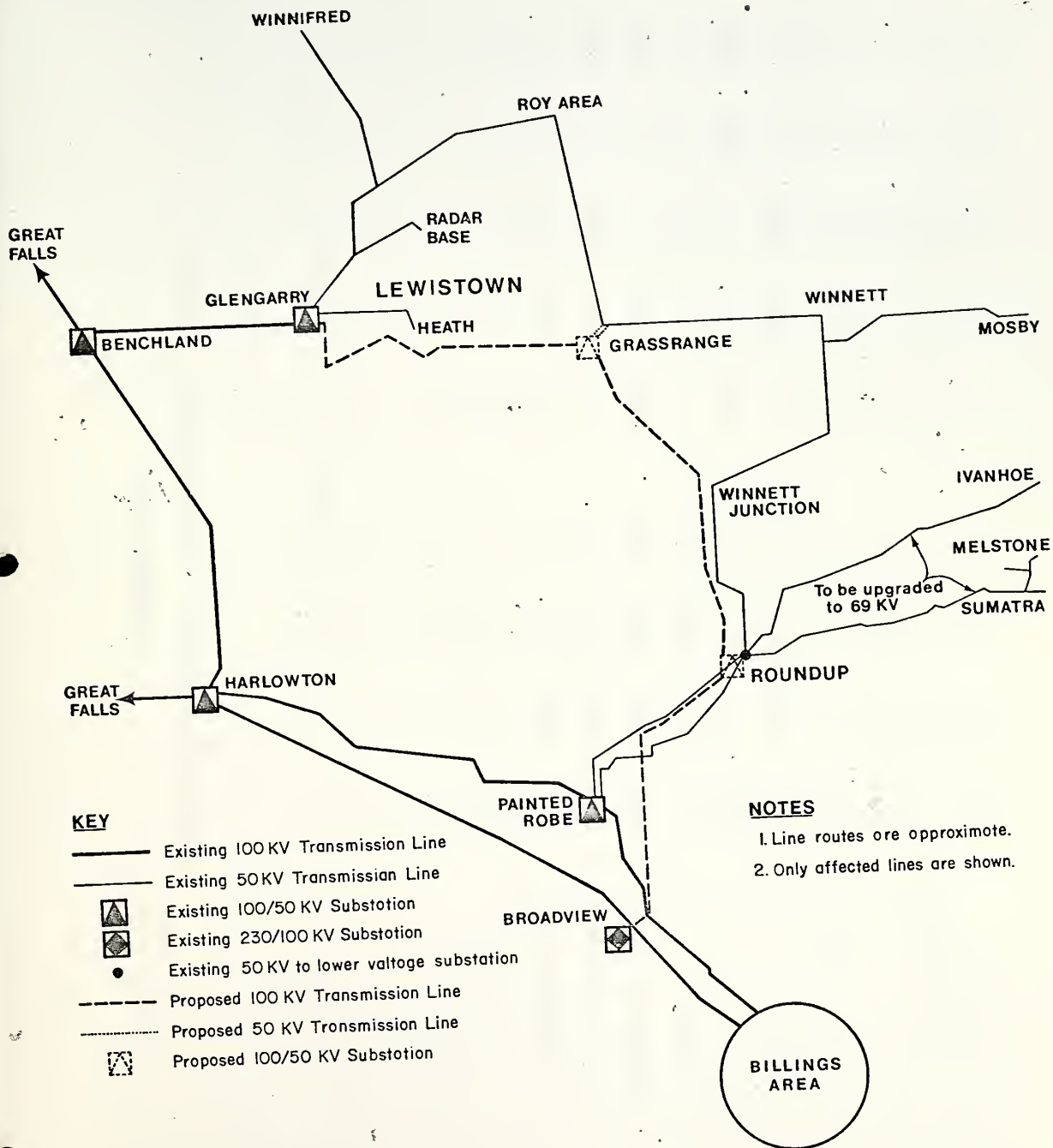


Figure 2

TABLE 1

ROUNDUP AREA

ESTIMATED PEAK SUBSTATION LOAD IN KILOWATTS 1976 - 1986

Inst. No.	Substation	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	Approx. Rate of Growth %
3- 110	Anderson	25	25	25	25	25	25	25	25	25	25	0
3- 120	Broadview	707	748	792	837	884	933	984	1037	1093	1150	5.8
3- 125	Jensen	258	260	263	265	268	271	274	276	279	282	0.8
3- 130	Ivanhoe No. 1	2081	2236	2409	2602	2816	3055	3320	3616	3944	4310	7.4
3- 140	Little Wall No. 2	505	506	508	509	510	511	512	513	514	516	0.3
3- 150	Willow Creek No. 3	316	318	320	322	324	326	328	330	332	335	0.6
3- 160	Roundup No. 4	810	825	840	856	872	888	904	921	938	955	1.9
3- 170	Cushman	100	103	106	109	115	116	119	123	127	130	3.0
3- 180	Gage	1039	1134	1237	1350	1474	1609	1756	1917	2092	2283	9.2
3- 190	Ivanhoe	1181	1229	1278	1330	1383	1439	1497	1558	1620	1686	4.1
3- 195	Keefer - Eklund	248	261	274	289	304	319	336	354	372	392	5.2
3- 200	Lavina	541	563	585	609	633	659	685	712	741	771	4.1
3- 210	Lavina (Fergus Rea)	96	97	98	99	100	101	102	102	103	104	1.1
3- 220	Melstone No.1	906	910	915	919	924	928	933	937	942	947	0.4

Table 1 (continued)

Inst. No.	Substation	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	Approx. Rate of Growth %
3- 230	Mountain States Min	697	713	731	748	766	784	803	823	842	863	2.3
3- 240	Musselshell	518	549	582	616	653	691	732	776	822	871	6.0
3- 245	M.V. Feedlot	66	68	70	72	74	76	79	81	84	86	3.0
3- 250	Roundup	5239	5284	5329	5375	5422	5469	5517	5565	5614	5664	0.8
3- 260	Roundup-Fergus REA	5867	6461	7116	7836	8630	9505	10468	11528	12696	13982	10.1
3- 270	Roundup-McCone REA	1452	1491	1531	1573	1616	1660	1705	1751	1798	1847	2.7
3- 280	Ryegate	558	585	614	643	675	708	742	778	816	856	4.8
3- 290	Ryegate-Fergus REA	378	394	410	427	444	463	482	501	522	543	4.2
3- 300	Sumatra	4030	4311	4610	4931	5274	5641	6033	6452	6901	7381	7.0

TABLE 2

LEWISTON AREA

ESTIMATED PEAK SUBSTATION LOAD IN KILOWATTS 1976 - 1986

Inst. No.	Substation	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	Approx. Rate of Growth %
4- 13	Harlowton Dist.	2089	2121	2154	2187	2221	2255	2290	2325	2361	2397	1.5
4- 40	Utica	1124	1208	1298	1395	1498	1610	1730	1859	1997	2146	7.5
4- 120	Harlowton REA	914	989	1071	1160	1257	1361	1474	1596	1729	1872	8.2
4- 130	Winnecook K-6	31	30	29	28	27	26	25	24	24	23	3.2
4- 131	Boulevard	6284	6400	6518	6639	6762	6887	7015	7144	7277	7411	1.9
4- 140	Shawmut	88	83	79	74	71	67	63	60	57	54	5.7
4- 150	Shawmut REA	25	25	25	25	26	26	26	26	27	27	0.1
4- 170	Barber	166	170	175	180	186	192	199	206	215	224	2.4
4- 200	Nihill	888	953	1022	1096	1176	1261	1353	1452	1557	1670	7.3
4- 211	Judith Gap	367	373	378	384	389	395	401	407	413	420	1.6
4- 220	Stram	825	848	872	897	922	947	974	1001	1029	1058	2.8
4- 231	Ruby Gulch REA Sub	850	850	875	900	928	957	986	1015	1046	1078	1.5
4- 240	Moose	978	1008	1041	1077	1116	1157	1203	1252	1305	1362	3.1

Table 2 (continued)

Inst. No.	Substation	76-77	77-78	78-79	79-80	89-81	81-82	82-83	83-84	84-85	85-86	Approx. Rate of Growth %
4- 260	Glengarry REA	1277	1287	1296	1306	1316	1326	1336	1346	1357	1367	0.8
4- 270	Lewistown No. 1	2631	2685	2739	2794	2851	2908	2967	3027	3088	3151	2.1
4- 280	Heath REA	1326	1362	1398	1435	1473	1512	1553	1594	1636	1680	2.7
4- 290	Heath U.S. Gypsum	962	966	969	973	976	980	984	987	991	994	0.4
4- 340	Lewistown Radar	272	274	276	278	280	282	284	285	287	290	0.7
4- 350	Hilger REA	5500	5731	5972	6223	6485	6758	7042	7338	7647	7969	4.2
4- 410	Lewis, No. 3 Peavey	208	208	209	209	209	210	210	210	211	211	0.2
4- 420	Hanover Jct.	149	152	155	158	161	164	168	171	174	178	2.0
4- 440	Kolin REA	461	485	512	538	568	599	631	665	701	739	5.2
4- 450	Moccasin	537	559	581	604	627	652	676	702	728	755	4.1
4- 460	Windham	978	1054	1136	1224	1320	1423	1534	1653	1782	1921	7.8
4- 510	Denton	1727	1736	1745	1754	1763	1772	1781	1791	1800	1809	0.5

the assumption that load will indeed continue to grow at historically established levels.

In addition, the applicants have listed nine new applications from the area for power varying between 200 KW and 3800 KW during the period 1976-1977. The total power requirement adds up to 7,669 KW. The information given by the applicants on some of these loads is considered insufficient for a realistic analysis and the Department has unsuccessfully tried to obtain supporting data from the applicants. If these loads are accepted at face value, they represent a growth rate well in excess of that obtained from historical data.

3. Voltage Levels in General

Most MPC distribution substations have tap settings on stepdown transformers and voltage regulators on the low voltage side. Some voltage correction is, therefore, possible. Transformer tap settings and the action of voltage regulators can boost the voltage up to 15%. In order to maintain nominal voltage on the distribution system the primary voltage at a distribution substation should not drop below 85% of nominal.

In general electricity distribution lines are fairly long and have an associated voltage drop. Distribution voltage at a substation maintained at an above nominal level will reduce the total voltage drop along the distributor thereby making it easier for the power company to maintain consumer voltage within limits laid down by the Public Service Commission. It is accepted practice to maintain the distribution voltage at a maximum of 5% above nominal under normal operating conditions. This limits the primary voltage at a distribution substation to a minimum of 90% of nominal under normal operating

conditions, i.e., no outage on the transmission system.

4. Critical Problem and Its Solution

Excessive voltage drop associated with an overstretched 50 kV system is the critical problem. Load flow and voltage studies carried out by the MPC show that the voltage level at Grassrange will drop by 26.9% from the nominal voltage during the 1976 heavy winter peak with no outage on the transmission system and no additional block load connected (see Table 3). Because the voltage drop is largely resistive in nature, the installation of capacitors or synchronous condensers cannot be used to offset the voltage drop.

5. Proposed Solution - Plan A

The applicants propose to build a 118-mile 100 kV transmission line between the Broadview and Glengarry substations. Since the line would pass through Roundup and Grassrange, it would provide vital support to the 50 kV system. The MPC also plans to upgrade the two Roundup and Melstone-Sumatra 50 kV lines to 69 kV operation.

Because of the urgency of the situation, the applicants propose to build the 22-mile section of the proposed 100 kV line between Winnett Junction and Grassrange this fall - in time for the 1976 heavy winter. Voltage levels at extremities of the 50 kV system during 1976 heavy winter both with the system as at present and with the addition of the Winnett Junction-Grassrange 100 kV line operating at 50 kV are shown in Table 3. Some voltage improvement is clearly evident.

Load flows have also been produced for the following conditions assuming 1979 heavy winter loads:

TABLE 3

VOLTAGE LEVELS AT EXTREMITIES OF THE AFFECTED 50 KV SYSTEM

Study No.	Substation 50 kV Busbar Voltage As Per Unit of 50 kV								MPC Load Flow Reference:
	Roundup 3086	Grassrange 4635	Melstone 3093	Ivanhoe 3089	Sumatra 3095	Winifred 4633	Hilger 4035	Heath 4029	
1976 Heavy Winter									
1.	With system as at present								
	0.945	0.731	0.914	0.868	0.852	0.865	0.898	0.931	76HWBC
2.	With 50 kV line between Winnett Junction and Grassrange								
	0.961	.884	.931	.886	.871	.865	.899	.931	76HWRASE6
1979 Heavy Winter (with proposed 100 kV system)									
3.	Taps not adjusted								
	0.952	0.911	0.945	0.911	0.901	0.801	0.845	0.855	79HWBC3
4.	Taps adjusted								
	1.032	0.999	1.028	0.999	0.988	0.930	0.968	0.978	79HWTBC 1
5.	Taps adjusted and Broadview-Roundup 100 kV line out								
	0.916	0.915	0.908	0.872	0.861	0.846	0.887	0.899	79HWT Case 1

- (i) Transformer taps as at present
- (ii) Transformer taps adjusted at Broadview 230/100 kV and Glengarry 100/50 kV substations to give voltage boosts of +5% and +2½% respectively.
- (iii) Transformer taps adjusted as above and Broadview-Roundup 100 kV line out on fault.

Voltage levels at the extremities of the 50 kV system under each of the above conditions are shown in Table 3.

A comparison of the 1976 heavy winter case (study no. 1) with 1976 heavy winter case (study no. 3) indicates that after the construction of the 100 kV Broadview-Glengarry line the voltage levels in 1979 at Roundup, Grassrange, Melstone, Ivanhoe and Sumatra are well above the 1976 levels in spite of an increase in load. Voltage levels in 1979 at Winifred, Hilger, and Heath are substantially less than the levels in 1976.

By adjusting the transformer taps at Broadview and Glengarry substations, the voltage levels all over the 50 kV system will be improved.

The final load flow tabulated in Table 3 examines the effect of an outage on the Broadview-Roundup section of the 100 kV line between Broadview and Glengarry. Voltage levels of 0.846, 0.861, 0.872, 0.887 and 0.899 are obtained for Winifred, Sumatra, Ivanhoe, Hilger, and Heath respectively. Although these levels are below the normal value of 0.9, they are within 15% of the nominal. Such a voltage level can be considered adequate for a moderate duration outage on the Broadview-Roundup line. In the event of an extended outage, further voltage improvement can be obtained by adjusting taps on the Glengarry 100/50 kV transformer.

It is clear from the foregoing that while the proposed 100 kV line will undoubtedly improve voltage levels throughout the 50 kV system under normal operating conditions, voltage levels under an outage condition on the Broadview-Roundup are well below 0.9 in 1979 at some points and will get much worse in later years. This is largely due to a comparatively poor primary voltage at Glengarry. In the time available, it has not been possible to carry out further engineering studies. Any such study, however, will have no effect on the "need" for the proposed transmission line.

6. Alternatives Considered

Three alternative plans have been considered by the applicants:

Plan B: Establish a 10 MW generating station in the Grassrange area so that some of the load is taken off the two overstretched 50 kV lines

Plan C: Upgrade the Roundup-Sumatra and Grassrange area's 50 kV system to 69 kV operation

Plan D: Construct a 100 kV transmission line from Broadview to Roundup and a second 100 kV line from Benchland to Glengarry. Also, upgrade the Roundup-Melstone-Sumatra area's 50 kV system to 69 kV operation

7. Comparison of Alternatives

Plan B: A power station to the Grassrange area will improve voltage conditions to an acceptable level throughout the system until the 1979 heavy summer peak. Due to the inherent limitations of 50 kV transmission, satisfactory voltage levels cannot be maintained beyond 1979 without further transmission reinforcement.

From another standpoint, however, local generation is undesirable. The only source of power from a 10 MW generator is combustion oil or gas turbines.

Building such a power station is inconsistent with the national goal of eliminating oil- and gas-fired power generation.

Plan C: Upgrading the transmission system from 50 kV to 69 kV marginally improves voltage conditions, but the improved voltage levels remain inadequate.

Plan D: The addition of 100 kV transmission lines, though satisfactory under normal operating conditions, does not provide the same degree of voltage improvement as Plan A when system operation with the 100 kV Broadview to Roundup line is out of service.

III. Determination of the Extent of Environmental Impacts for the 22.5-Mile Grassrange-Winnett Junction Segment

A. Geology and Physiography

The preferred and alternative routes for this segment cross a landscape which has developed on sedimentary rocks of upper Cretaceous and Tertiary age, forming the eastern slope of the Big Snowy Mountain uplift. These rocks consist of shales, claystones, siltstones, and sandstones. Bedrock outcrops are infrequent.

The area is one of moderate relief. Valleys are wide and shallow, and slopes seldom exceed 30%. Elevations range from a low of 3,500 feet at Grassrange to over 4,400 feet approximately six miles southeast of Grassrange. In general, the landscape immediately east of Highway 87 is somewhat more rugged than that to the west, and includes relatively steep timbered areas adjacent to the South Fork of Elk Creek.

Construction of a 100 kV transmission line through this region would not adversely affect geological formations. More important are the constraints

placed upon construction activities and machinery movement by the steeper slopes. Areas of steep slopes, however, are infrequent and easily avoided within the preferred corridor.

B. Climate

Average annual precipitation in the area ranges from 12 to 18 inches per year, with approximately 75% of precipitation falling during the growing season (April to September). Mean annual temperatures are near 43°F. Winds are primarily from the southwest, with estimated average velocities of 10-14 miles per hour. Snow has been recorded during every month, and winter storms can be locally severe.

Due to the relatively low annual rainfall in the area, the risk of erosion or sedimentation under normal conditions is low. Strong winds may be of concern where the line crosses ridges, but should not pose a hazard to line operation in other areas. Removal of soils by wind in areas where construction has destroyed vegetative cover can be expected to result in local erosion.

C. Hydrology

The largest perennial stream which would be crossed by the proposed line is Flatwillow Creek, which flows eastward across the preferred and alternative routes. Although the existing sediment load of this stream is high, line construction is not expected to add significantly to sedimentation in Flatwillow Creek or in the several ephemeral streams which also cross this segment. No significant impacts upon groundwater are expected.

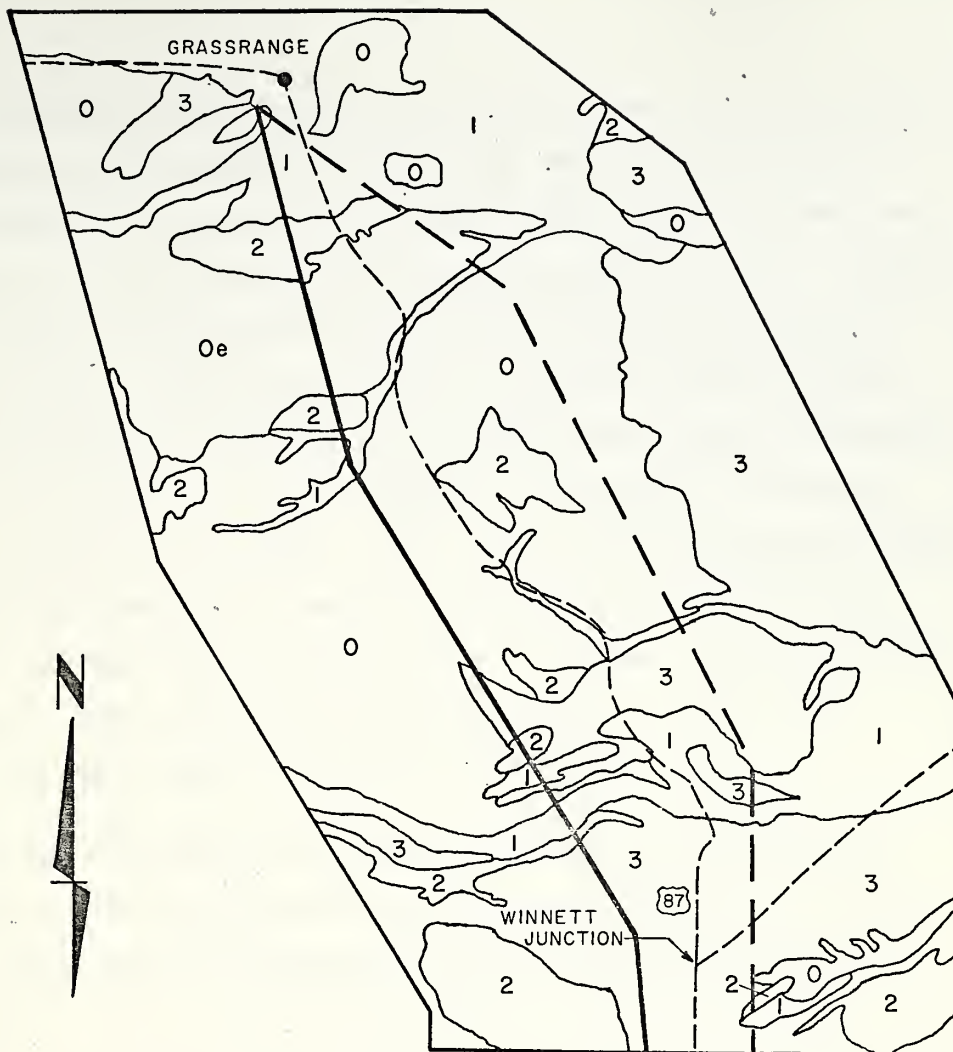
D. Soils

In reviewing this segment for soil hazards, no comparisons among soil units were made since the purpose is to identify soil areas having potential environmental impacts or accessibility problems. This identification of impacts and limitations does not attempt to assess the degree or severity of the problems, but merely to indicate where further consideration of planning and mitigating measures may be necessary.

One potential concern regarding soil was identified: soil erosion by wind and water. Inherent erodibility and susceptibility to man-induced erosion have been considered together as potential erosion hazard in reviewing the soil units. Three soil characteristics combine to identify the problem of accessibility: frequent wetness such as flooding or swampiness, more than moderate alkalinity with salinity, and expansive clays.

To determine where erosion hazard and accessibility problems may exist, the Soil Survey Reconnaissance of Central Montana prepared by the Soil Conservation Service (SCS) and the Montana Agricultural Experiment Station (1953) was used. That same survey, various other surveys, and soil series descriptions were used to determine the potential erosion hazard and limitations to access, as defined, for each unit. By combining like units, the potential Soil Hazards map was produced for the entire line proposed in the application. The section from Winnett Junction to Grassrange is reproduced here as Figure 3.

The Hazards map has four categories: 0, 1, 2, and 3. Category 0 defines those areas having neither significant potential erosion hazards nor accessibility problems, or having potential erosion hazard only if the soil is greatly disturbed (more so than should occur in the construction of a 100 kV line).



WINNETT JUNCTION TO GRASSRANGE 100KV
EXCERPT FROM POTENTIAL SOIL HAZARDS MAP

Applicant's Preferred Corridor ———
 Applicant's Alternative Corridor - - -
 Mapping Units (3) (described in text)
 Roads - - - - -

Scale: 1:250,000 (1 inch = 4 miles)

Figure 3

Category 1 contains areas with accessibility problems due to frequent wetness, alkalinity and salinity, expansive clays or any combination of the three. Although accessibility is less of a problem at certain times of the year than at others, it is still a concern that the applicants must deal with. Category 2 shows potential erosion hazards where the soil unit may, when disturbed, suffer from loss of topsoil and gull and rill formation, and may contribute to stream sedimentation. Category 2 also includes areas in which soil blowing or drifting may occur. This may contribute to dust annoyance, and strong winds are a threat for crop damage. Such damage can and has occurred, according to the Reconnaissance Survey. Where erosion damage already exists, it is possible to accelerate the process and worsen the damage. Category 3 has the properties of both of the first two categories; that is, it has both a potential erosion hazard and an accessibility problem.

The four categories are not intended to be comparative or quantitative. They serve to indicate on the map areas that may have relevant soil problems and may deserve further consideration in terms of planning and mitigating measures.

E. Vegetation

1. Rangeland

Grasslands in the area are floristically variable, reflecting variable sites and grazing histories. Bluebunch wheatgrass, western wheatgrass, needle-and-thread, and sandberg bluegrass are frequent dominants in the area of the proposed line near Grassrange (scientific names of plants mentioned here are available at the Department).

Associate grasses are blue grama, prairie junegrass, green needlegrass, plains reedgrass, and smooth brome. Threadleaf sedge and needleleaf sedge are often present. Fescues may be encountered on northerly aspects.

Sagebrushes, usually big sagebrush, are often co-dominants with grasses. Fringed sagewort is frequently encountered, while silver sagebrush is less common. Creeping juniper, yucca, plains pricklypear, and shrubby cinquefoil are occasionally encountered, but do not occupy large areas.

Progressing southward from Grassrange, fescue appears to drop out of the flora, while species favored by a drier climate remain. Blue grama, needle-and-thread, western wheatgrass, and sagebrush continue to dominate.

Approaching Winnett Junction, fringed sagewort increases in coverage. Blue grama, needle-and-thread, prairie junegrass, western wheatgrass, and threadleaf sedge and needleleaf sedge are often dominant. Clubmoss is often abundant.

In rangeland, the impact of the proposed transmission line on vegetation is not expected to be significant. Cross-country travel is not expected to significantly affect vegetation, and road construction should not be necessary.

2. Forests

In the northern portion of the Grassrange-Winnett Junction segment, forested stands are common. In the immediate vicinity of Grassrange, Douglas fir may occasionally be found on north slope aspects or near streams, but pure stands of ponderosa pine are generally the rule. The understory of these ponderosa pine stands is variable. On cooler and moister aspects, snowberry, Oregon grape, creeping juniper, common juniper, squaw current, and grasses are

understory associates. These stands sometimes fit the description of the Ponderosa pine/snowberry habitat type. Basal areas in these stands are moderate to low, and stocking is good.

On warmer and drier aspects, many prairie species are found in the pine understory, and Rocky Mountain juniper may be nearly co-dominant with ponderosa pine. Basal areas and stocking are low. Soils are usually very shallow.

The potential for disturbance to forest stands, particularly dense stands on northerly aspects, is greater than that of rangeland. Forests are slower to recover than rangeland, if only because of the longevity of trees. Most forest stands can be avoided by judicious line placement.

F. Aquatic Fauna

Although the upper reaches of Flatwillow Creek have been classified as a fishery of county-wide value, perennial streams support a marginal and lightly utilized sport fishery where crossed by the preferred and alternative routes. Line construction is not expected to measurably affect sport fish or other aquatic fauna in these streams.

G. Terrestrial Fauna

The proposed facility would affect no endangered or threatened wildlife species, or any unique or highly vulnerable habitats or communities. Although the area contains excellent habitat for mule deer, white-tailed deer, and pronghorn, construction and operation of a 100 kV transmission line will not adversely affect habitat or interfere with movements. Potential adverse impacts to wildlife may result from (1) wire strikes by birds, primarily

waterfowl, and (2) disturbance of sage grouse or sharptail grouse display areas.

Mortality of birds due to collisions with transmission lines has been well-documented. Waterfowl losses may be locally heavy where the line crosses or skirts wetlands, especially during storms or periods of fog and reduced visibility. The proposed line separates two waterfowl concentration areas, Lake Mason and War Horse Lake National Wildlife Refuges. Some waterfowl mortality due to wire strikes can be expected where the line crosses major streams, stockponds, or reservoirs. However, these losses are not expected to significantly affect population size or carrying capacity for any of the species using these areas.

Sage grouse and sharptail grouse congregate in April and May at traditional display grounds, which are returned to year after year. Breeding takes place on these grounds, and nesting generally occurs within a mile or two. Disturbance of these areas by construction can result in abandonment of the grounds and curtailment of the year's production of young. It has been suggested that nearby power poles may also lead to abandonment, as the poles may be used as hunting perches for golden eagles or other raptors.

The proposed line crosses excellent sage grouse and sharptail grouse habitat, but the locations of breeding grounds in this area are not well-known. No grounds have been located near the preferred route, and only one sage grouse strutting ground (S8, T12 N, R 25E) and two sharptail grouse dancing grounds (center, S boundary, S2, T13 N, R 24E; and center, S boundary, S16, T13 N, R 24E) have been located along the alternative route. Late summer construction will not affect breeding activity at display grounds, but care should be taken to avoid vegetation alteration or pole siting in their immediate vicinity.

H. Land Use

The predominant land use in this segment is grazing. A large area of dry cropland is found in the south Willow Creek area. The proposed facility is not expected to significantly increase impacts upon these land uses.

The primary transportation corridor is Highway 87, which is paralleled by preferred and alternative routes. Gravel roads are few, and, in fact, access via gravel roads may be obtained to the preferred route in only three areas, and to the alternative route in only two areas. Farm roads or other primitive roads may be used to provide access in certain areas, but the primary access to preferred and alternative routes would require cross-country travel. It is unlikely that new access roads will be needed to provide access unless the line crosses the timbered hills to the east of Highway 87 and northwest of Flatwillow Creek.

Population density in the area is low, and few residences would be affected by a line through this area. The only population center in the area is the small town of Grassrange, which had a population of 181 in 1970. The preferred route would skirt Grassrange by approximately one mile to the east; the alternative route would come much closer.

No unique recreation areas or known historical/archaeological sites are traversed by either route.

I. Aesthetics

The potential for visual impact from a transmission line varies with the character of the land, viewers' expectations of what should be present, and the number of potential viewers. The preferred and alternative routes are

located 1-3 miles from Highway 87, and would be viewed by relatively few people. The proposed route crosses grazing land and some cultivated land; the expectation to see a transmission line is not generally in conflict with the local conditions.

J. Social-Economic Concerns

The physical presence of this transmission line segment in the applicants' preferred corridor between Winnett Junction and Grassrange is not expected to have significant social-economic impacts. This is not to say that impacts resulting from the entire system proposed from Broadview to Glengarry would necessarily be insignificant.

There are, however, "nuisance" impacts which are broadly classified as social. They may be prevented through engineering design and conscientious supervision of construction and maintenance activities. Frequently listed impacts of this type include:

1. Property damage to crops, agricultural land, fences, and gates by construction and maintenance crews straying off the right-of-way or access roads with private vehicles and construction equipment.
2. Domestic animals escaping from enclosures because transmission line workmen left gates open or damaged fences. Loose live-stock constitute a hazard to operators of motor vehicles, a potential property loss to their owners if they are killed, injured, or lost, and a possible source of crop damage.

3. Construction and maintenance activities are being followed with sufficient clean-up and restoration. Special reference is made to inadequate debris disposal and improper vegetative re-seeding.
4. Tower structures taking cropland out of production. This will not be a significant problem in this area because of the small amount of cropland potentially affected.

These types of impacts are not expected to constitute significant social impact in this segment.

The proposed transmission line will have a slight effect on the tax base of the counties crossed. Some addition to the tax base is certain, but the amount is unspecifiable at this time. The line does constitute a small addition to the county tax base which will be present for many years to come. Local tax bases will also be affected by substations and other facilities associated with the proposed line. This property is locally assessed and generally considered along with the tax on transmission lines.

Social-economic concerns will not be significantly affected by the construction crews, population increase, or other construction variables because the project is small in scale, and the local physical conditions are not in conflict with the proposed transmission line.

IV. Mitigation of Environmental Impact

The previous section has indicated that the proposed 22.5-mile segment from Grassrange to Winnett Junction is not a major action which will significantly affect the quality of the human environment. Therefore, compilation of an EIS

on that segment is not required. However, construction of the line constitutes a land use change, and some impact upon the environment is unavoidable no matter where the line is sited. Recognizing that some impacts will occur, although they may not be locally or regionally significant, the Department is obliged to insure that these impacts are mitigated to the greatest extent feasible. The following mitigating measures for line construction are recommended by the Department as conditions of a certificate, if granted:

(1) Use existing access roads where available.

(2) Where access roads are not available, restrict the cross-country movement of machinery to certain designated routes approved by the Department and flagged for visibility. Off-route travel should be limited to pole sites.

(3) Do not erect towers within one-fourth mile of known sage grouse or sharptail display grounds, within 100 yards of larger water areas, or within 100 feet of perennial streams.

(4) Cross perennial streams at right angles.

(5) Use temporary bridges or culverts for vehicular crossings of streams to avoid damage to channel banks.

(6) Limit construction to dry periods when accessibility is optimum and soil disturbance will be at a minimum. There should be no reason to bare any patch of soil or vegetation.

(7) Avoid forest stands in centerline selection.

(8) Close and seed roads or travel routes with a mixture of at least three of the species listed below in Table 4:

TABLE 4

Generic Name	Common Name	Pounds Seed ¹ Per Acre
<u>Agropyron cristatum</u>	crested wheatgrass	12.4
<u>Agropyron dasystachyum</u>	thickspike wheatgrass	13.4
<u>Agropyron inerme</u>	beardless wheatgrass	10.9
<u>Agropyron riparium</u>	streambank wheatgrass	11.2
<u>Agropyron smithii</u>	western wheatgrass	18.8
<u>Elymus junceus</u>	Russian wildrye	15.5
<u>Festuca ovina</u> var. <u>duriscula</u>	sheep fescue	12.4
<u>Stipa viricula</u>	green needlegrass	52.2

¹For mixture, divide by number of species in mixture.

VI. Persons, Agencies, and Groups Contacted In Relation To the Proposed Action

Jim Mitchell, Montana Department of Fish and Game, Great Falls

Bob Watts, Montana Department of Fish and Game, Lewistown

Bill Krantz, U.S. Fish and Wildlife Service, Lewistown

Buck Compton, Montana Department of Fish and Game, Billings

VII. Other Sources of Data

Fergus County USDA Committee for Rural Development. No Date. Situation Statement (with special emphasis on agriculture).

U.S.D.I., Bureau of Land Management. 1971. Land planning and classification report of the public domain lands in the Musselshell River area, Montana. Denver, Colorado. 44 pp. plus appendices.

Wallestad, R. 1975. Life history and habitat requirements of sage grouse in central Montana. Helena, Montana Department of Fish and Game. 65 pp.

